What Is Claimed Is:

1. A method for I/Q mismatch calibration of a transmitter, comprising the following steps:

generating a discrete-time signal $x[n]=x(n \cdot T_s)$, wherein $x(t)=e^{j2\pi f_T t}$ and f_T and T_s are real numbers;

obtaining a corrected signal $x_c[n]$ based on the signal $x[n]$ and a set of correction parameters A_p and B_p, wherein $x_c[n]=A_p \cdot x[n]+B_p \cdot x^*[n]$;

converting the corrected signal $x_c[n]$ to an analog corrected signal $x_c(t)$;

applying I/Q modulation to the analog corrected signal $x_c(t)$ and outputting a modulated signal $x_m(t)$;

obtaining a first desired component measure $W^{(1)}(f_T)$ and a first image component measure $W^{(1)}(-f_T)$ from the modulated signal $x_m(t)$ with a first set of the correction parameters A_p and B_p;

obtaining a second desired component measure $W^{(2)}(f_T)$ and a second image component measure $W^{(2)}(-f_T)$ from the modulated signal $x_m(t)$ with a second set of the correction parameters A_p and B_p;

obtaining a third desired component measure $W^{(3)}(f_T)$ and a third image component measure $W^{(3)}(-f_T)$ from the modulated signal $x_m(t)$ with a third set of the correction parameters A_p and B_p;

obtaining a fourth and fifth set of correction parameters A_p and B_p based on the first, the second, and the third desired component measures as well as the first, the second, and the third image component measures;

obtaining a fourth desired component measure $W^{(4)}(f_T)$ and a fourth image component measure $W^{(4)}(-f_T)$ from the modulated signal $x_m(t)$ with the fourth set of correction parameters A_p and B_p;

obtaining a fifth desired component measure $W^{(5)}(f_T)$ and a fifth image component measure $W^{(5)}(-f_T)$ from the modulated signal $x_m(t)$ with the fifth set of correction parameters A_p and B_p; and

obtaining a final set of the correction parameters A_p and B_p from the fourth and fifth sets of correction parameters.

2. The method for I/Q mismatch calibration of a transmitter as claimed in claim 1, wherein the first set of correction parameters $(A_p, B_p) = (a, 0)$, the second set of correction parameters $(A_p, B_p) = (b, b)$, and the third set of correction parameters $(A_p, B_p) = (b, -b)$, where a and b are real numbers.

3. The method for I/Q mismatch calibration of a transmitter as claimed in claim 2, wherein the parameter a is 1 and the parameter b is 1/2.

4. The method for I/Q mismatch calibration of a transmitter as claimed in claim 1, wherein the fourth set of correction parameters (A_p, B_p) are obtained by

$$A_p = \sqrt{P} - j\hat{\alpha}\sqrt{Q}$$
$$B_p = -\hat{\alpha}\sqrt{P} - j\sqrt{Q}$$

and the fifth set of correction parameters (A_p, B_p) are obtained by

$$A_p = \sqrt{P} + j\hat{\alpha}\sqrt{Q}$$
$$B_p = -\hat{\alpha}\sqrt{P} + j\sqrt{Q}$$

where

$$\alpha \approx \hat{\alpha} = \frac{\sqrt{N/O} - 1}{\sqrt{N/O} + 1},$$

$$N = (W^{(2)}(f_T) + W^{(2)}(-f_T))/2,$$

$$O = (W^{(3)}(f_T) + W^{(3)}(-f_T))/2,$$

$$Q = \frac{\hat{\alpha}^2 - \rho^{(1)}}{(1+\rho^{(1)})(\hat{\alpha}^2 - 1)},$$

$$P = 1 - Q,$$

$$\rho^{(1)} = \frac{W^{(1)}(-f_T)}{W^{(1)}(f_T)}.$$

5. The method for I/Q mismatch calibration of a transmitter as claimed in claim 1, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if a function of $W^{(4)}(-f_T)$ is less than the function of $W^{(5)}(-f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

6. The method for I/Q mismatch calibration of a transmitter as claimed in claim 5, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if $W^{(4)}(-f_T)$ is less than $W^{(5)}(-f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

7. The method for I/Q mismatch calibration of a transmitter as claimed in claim 1, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if a function of $W^{(4)}(f_T)$ is greater than the function of $W^{(5)}(f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

8. The method for I/Q mismatch calibration of a transmitter as claimed in claim 7, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if $W^{(4)}(f_T)$ is greater than $W^{(5)}(f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

9. The method for I/Q mismatch calibration of a transmitter as claimed in claim 1, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if a function of $W^{(4)}(-f_T)$ and $W^{(4)}(f_T)$ is less than the function of $W^{(5)}(-f_T)$ and $W^{(5)}(f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

10. The method for I/Q mismatch calibration of a transmitter as claimed in claim 9, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if $W^{(4)}(-f_T)/W^{(4)}(f_T)$ is less than $W^{(5)}(-f_T)/W^{(5)}(f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

11. The method for I/Q mismatch calibration of a transmitter as claimed in claim 1, further comprising the following steps:

further adding an DC compensation parameter γ_p while obtaining the corrected signal $x_c[n]$ such that $x_c[n] = A_p \cdot (x[n] + \gamma_p) + B_p \cdot (x[n] + \gamma_p)^*$;

obtaining a first local leakage component measure L_1 from the modulated signal $x_m(t)$ with the final set of parameters A_p and B_p, and the parameter $\gamma_p = \zeta_1$, where ζ_1 is a real number;

obtaining a second local leakage component measure L_2 from the modulated signal $x_m(t)$ with the final set of parameters A_p and B_p, and the parameter $\gamma_p = \zeta_2$, where ζ_2 is a real number;

obtaining a third local leakage component measure L_3 from the modulated signal $x_m(t)$ with the final set of parameters A_p and B_p, and the parameter $\gamma_p = j\zeta_1$;

obtaining a fourth local leakage component measure L_4 from the modulated signal $x_m(t)$ with the final set of parameters A_p and B_p, and the parameter $\gamma_p = j\zeta_2$;

obtaining a fifth local leakage component measure L_5 from the modulated signal $x_m(t)$ with the final set of parameters A_p and B_p, and the parameter $\gamma_p = 0$; and

obtaining a final DC compensation parameter $\gamma_{p,final}$ based on the first local leakage component measure L_1, the second local leakage component measure L_2, the third local leakage component measure L_3, the fourth local leakage component measure L_4 and the fifth local leakage component measure L_5.

12. The method for I/Q mismatch calibration of a transmitter as claimed in claim 11, wherein the final DC compensation parameter $\gamma_{p,final}$ is obtained by

$$\gamma_{p,final} = -\frac{1}{2}\cdot\frac{\zeta_2^2(L_1-L_5)-\zeta_1^2(L_2-L_5)}{\zeta_1(L_2-L_5)-\zeta_2(L_1-L_5)} - j\frac{1}{2}\cdot\frac{\zeta_2^2(L_3-L_5)-\zeta_1^2(L_4-L_5)}{\zeta_1(L_4-L_5)-\zeta_2(L_3-L_5)}.$$

13. An apparatus for I/Q mismatch calibration of a transmitter, comprising:

a signal generator for generating a discrete-time signal $x[n]=x(n\cdot T_s)$, wherein $x(t)=e^{j2\pi f_T t}$ and f_T and T_s are real numbers;

a correction module for receiving the discrete-time signal $x[n]$ and obtaining a corrected signal $x_c[n]$ based on the test signal $x[n]$ and a set of correction parameters A_p and B_p, wherein $x_c[n]=A_p\cdot x[n]+B_p\cdot x^*[n]$;

a first and second D/A converter converting the corrected signal $x_c[n]$ to an analog signal $x_c(t)$, wherein the first D/A converter converts the real part of the corrected signal to the real part of the analog signal, and the second D/A converter converts the imaginary part of the corrected signal to the imaginary part of the analog signal;

a modulator applying I/Q modulation to the analog signal $x_c(t)$, and outputting a modulated signal $x_m(t)$;

a measurer for implementing the steps of:

obtaining a first desired component measure $W^{(1)}(f_T)$ and a first image component measure $W^{(1)}(-f_T)$ from the modulated signal $x_m(t)$ with a first set of the correction parameters A_p and B_p;

obtaining a second desired component measure $W^{(2)}(f_T)$ and a second image component measure $W^{(2)}(-f_T)$ from the modulated signal $x_m(t)$ with a second set of the correction parameters A_p and B_p;

obtaining a third desired component measure $W^{(3)}(f_T)$ and a third image component measure $W^{(3)}(-f_T)$ from the modulated signal $x_m(t)$ with a third set of the correction parameters A_p and B_p;

obtaining a fourth desired component measure $W^{(4)}(f_T)$ and a fourth image component measure $W^{(4)}(-f_T)$ from the modulated signal $x_m(t)$ with a fourth set of correction parameters A_p and B_p; and

obtaining a fifth desired component measure $W^{(5)}(f_T)$ and a fifth image component measure $W^{(5)}(-f_T)$ from the modulated signal $x_m(t)$ with a fifth set of correction parameters A_p and B_p; and

a processor for implementing the steps of:

obtaining the fourth and fifth sets of correction parameters A_p and B_p based on the first, the second, and the third desired component measures as well as the first, the second, and the third image component measures; and

choosing a final set of correction parameters A_p and B_p from the fourth and fifth sets of correction parameters.

14. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 13, wherein the first set of correction parameters $(A_p, B_p) = (a, 0)$, the second set of

correction parameters $(A_p, B_p) = (b, b)$, and the third set of correction parameters $(A_p, B_p) = (b, -b)$, where a and b are real numbers.

15. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 13, wherein the parameter a is 1 and the parameter b is 1/2.

16. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 13, wherein the fourth set of correction parameters (A_p, B_p) are obtained by

$$A_p = \sqrt{P} - j\hat{\alpha}\sqrt{Q}$$
$$B_p = -\hat{\alpha}\sqrt{P} - j\sqrt{Q}$$

and the fifth set of correction parameters (A_p, B_p) are obtained by

$$A_p = \sqrt{P} + j\hat{\alpha}\sqrt{Q}$$
$$B_p = -\hat{\alpha}\sqrt{P} + j\sqrt{Q}$$

where

$$\alpha \approx \hat{\alpha} = \frac{\sqrt{N/O} - 1}{\sqrt{N/O} + 1},$$

$$N = (W^{(2)}(f_T) + W^{(2)}(-f_T))/2,$$

$$O = (W^{(3)}(f_T) + W^{(3)}(-f_T))/2,$$

$$Q = \frac{\hat{\alpha}^2 - \rho^{(1)}}{(1+\rho^{(1)})(\hat{\alpha}^2 - 1)},$$

$$P = 1 - Q,$$

$$\rho^{(1)} = \frac{W^{(1)}(-f_T)}{W^{(1)}(f_T)}.$$

17. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 13, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if a function of $W^{(4)}(-f_T)$ is less than the function of $W^{(5)}(-f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

18. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 17, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if $W^{(4)}(-f_T)$ is less than $W^{(5)}(-f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

19. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 13, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if a function of $W^{(4)}(f_T)$ is greater than the function of $W^{(5)}(f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

20. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 19, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if $W^{(4)}(f_T)$ is greater than $W^{(5)}(f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

21. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 13, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if a function of $W^{(4)}(-f_T)$ and $W^{(4)}(f_T)$ is less than the function of $W^{(5)}(-f_T)$ and $W^{(5)}(f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

22. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 21, wherein the final set of correction parameters (A_p, B_p) is set to be the fourth set of correction parameters if $W^{(4)}(-f_T)/W^{(4)}(f_T)$ is less than $W^{(5)}(-f_T)/W^{(5)}(f_T)$, otherwise the final set of correction parameters (A_p, B_p) is set to be the fifth set of correction parameters.

23. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 13, wherein the processor further implementing the steps of:

further adding an DC compensation parameter γ_p while obtaining the corrected signal $x_c[n]$ such that $x_c[n] = A_p \cdot (x[n] + \gamma_p) + B_p \cdot (x[n] + \gamma_p)^*$;

obtaining a first local leakage component measure L_1 from the modulated signal $x_m(t)$ with the final set of parameters A_p and B_p, and the parameter $\gamma_p = \zeta_1$, where ζ_1 is a real number;

obtaining a second local leakage component measure L_2 from the modulated signal $x_m(t)$ with the final set of parameters A_p and B_p, and the parameter $\gamma_p = \zeta_2$, where ζ_2 is a real number;

obtaining a third local leakage component measure L_3 from the modulated signal $x_m(t)$ with the final set of parameters A_p and B_p, and the parameter $\gamma_p = j\zeta_1$;

obtaining a fourth local leakage component measure L_4 from the modulated signal $x_m(t)$ with the final set of parameters A_p and B_p, and the parameter $\gamma_p = j\zeta_2$;

obtaining a fifth local leakage component measure L_5 from the modulated signal $x_m(t)$ with the final set of parameters A_p and B_p, and the parameter $\gamma_p = 0$; and

obtaining a final DC compensation parameter $\gamma_{p,final}$ based on the first local leakage component measure L_1, the second local leakage component measure L_2, the third local leakage component measure L_3, the fourth local leakage component measure L_4 and the fifth local leakage component measure L_5.

24. The apparatus for I/Q mismatch calibration of a transmitter as claimed in claim 23, wherein the final DC compensation parameter $\gamma_{p,final}$ is obtained by

$$\gamma_{p,final} = -\frac{1}{2}\cdot\frac{\zeta_2^2(L_1-L_5)-\zeta_1^2(L_2-L_5)}{\zeta_1(L_2-L_5)-\zeta_2(L_1-L_5)} - j\frac{1}{2}\cdot\frac{\zeta_2^2(L_3-L_5)-\zeta_1^2(L_4-L_5)}{\zeta_1(L_4-L_5)-\zeta_2(L_3-L_5)}.$$